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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,319	09/29/2003	Gregory C. Lee	LAM2P434	4630

25920 7590 03/22/2005

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SUNNYVALE, CA 94085

EXAMINER
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NGUYEN, GEORGE BINH MINH

ART UNIT	PAPER NUMBER
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3723

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/674,319

Applicant(s)

LEE ET AL.

Examiner

George Nguyen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 January 2005.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-36 is/are pending in the application.  
4a) Of the above claim(s) 8-10, 19-21, 23, 24 and 30-36 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-7, 11-18, 22 and 25-29 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on September 29, 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

Receipt is acknowledged of Applicant's election of Species I, Figures 3-4C, claims 1-7, 11-18, 22, 25-28, filed on January 25, 2005.

Claims 8, 9-10, 19-21, 23-24, and 30-36 were withdrawn from further consideration.

Claims 1-7, 11-18, 22, and 25-28 are presented for examination.

This application has been filed with formal drawings which are acceptable to the examiner.

### ***Election/Restrictions***

1. Applicant's election without traverse of Species I of Figures 3-4C, claims 1- 7, 11-18, 22, and 25-28 in the reply filed on January 25, 2005 is acknowledged.

### ***Drawings***

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "108" and "152" have both been used to designate "platen" in Figure 4C-2. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and

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informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Specification***

3. The disclosure is objected to because of the following informalities: Please insert U.S. Patent No. 6,776,695 in the Cross reference on page 1.

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

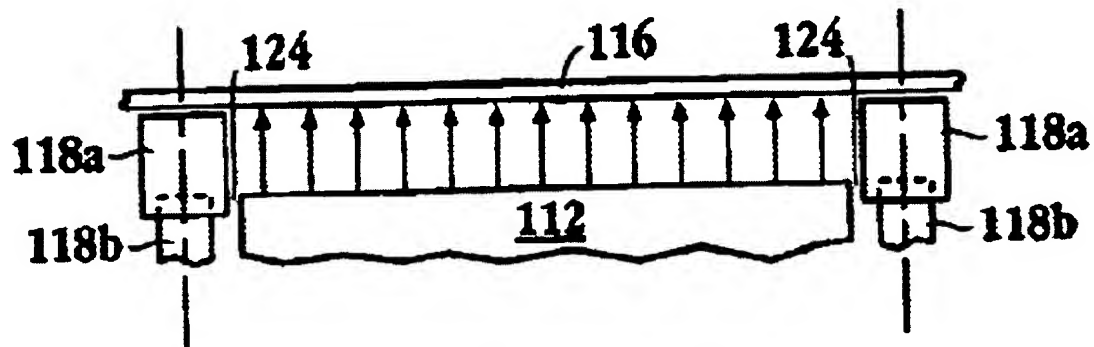
(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

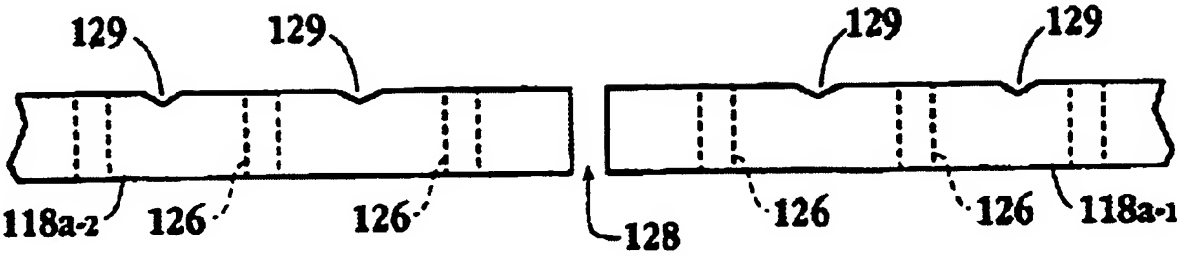
5. Claims 1-7, 11-18, 22, and 25-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Boyd et al.'6,656,024.

With reference to Figures 3 and 7, Boyd'024 discloses the claimed invention including:

- a. a platen 112 introducing air fluid beneath a polishing pad 116.
- b. a platen support cover 118a configured to surround the platen 112, the platen 112 being disposed at a first level and the platen support cover 118a being disposed at a second level, the first level being lower relative to the second level, the platen 112 and the platen support cover 118a configured to be disposed below a polishing pad 116 such that the polishing pad 116 is closer to the second level than the first level.
- c. at least one fluid output control path 129 defined through the platen support cover 118a, the at least one fluid output control path 129 enabling controlled release of fluid contained over the platen 112, surrounded by the platen support cover 118a, and beneath the polishing pad 116.



**Fig. 3**



**Fig. 7**

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(CDA) during a chemical mechanical planarization (CMP) operation in accordance with one embodiment of the invention.

#### DETAILED DESCRIPTION OF THE INVENTION

Several exemplary embodiments of the invention will now be described in detail with reference to the accompanying drawings. FIG. 1 is discussed above in the "Background of the Invention" section.

FIG. 2 is a simplified schematic diagram of a chemical mechanical planarization system (CMP) configured to reduce the consumption of compressed dry air (CDA) in accordance with one embodiment of the invention. A polishing surface 116 is mounted on rotors 114. Air-bearing platen 112 is disposed under polishing surface 116 and between rotors 114. As is well known to those skilled in the art, air-bearing platen 112 provides low friction support for the underside of polishing surface 116. Retaining ring 118 surrounding platen 112. Wafer carrier 108 is disposed over polishing surface 116 and supports wafer 110. During operation, rotors 114 rotate around their axis and drive polishing surface 116 in a linear direction over air-bearing platen 112. As wafer carrier 108 forces wafer 110 against the top surface of polishing surface 116, a layer of compressed dry air (CDA) from air bearing platen 112 supports polishing surface 116. Retaining ring 118 constrains the CDA layer between polishing surface 116 and platen 112. As will be explained in more detail below, retaining ring 118 is configured to minimize CDA losses without perturbing the interaction angle between polishing surface 116 and wafer 110.

FIG. 3 is a simplified cross-sectional view of a platen and a retaining ring in accordance with one embodiment of the invention. As shown therein, retaining ring 118 includes upper annular sleeve 118a and lower annular sleeve 118b. Upper annular sleeve 118a is moveably disposed over lower annular sleeve 118b and is capable of automatically aligning to the underside of polishing surface 116, as will be described in more detail below with reference to FIGS. 8-11. Lower annular sleeve 118b is fixed, i.e., rigidly attached, to a suitable part of the CMP system. It will be apparent to one skilled in the art that lower annular sleeve 118b can be attached to any parts of the CMP system that are capable of providing rigid support for the lower annular sleeve. In one embodiment, lower annular sleeve 118b is attached to platen 112. When upper annular sleeve 118a is in a raised position as shown in FIG. 3, the CDA from air-bearing platen 112 is constrained in a region defined by the upper annular sleeve, platen 112 and polishing surface 116. Additionally, transient losses at edge 124 of platen 112 are reduced, which in turn provides for tighter control of the removal rate at the edge of the wafer being planarized. It should be appreciated that the retaining ring allows for the controlled release of the constrained air, e.g., through the gap between the top of the upper annular sleeve and the underside of the polishing surface, to preclude chattering of the polishing surface. However, the amount of air lost via this controlled release is significantly reduced relative to the amount of air lost in conventional CMP systems.

FIG. 4 is a top view of an upper annular sleeve of a retaining ring in accordance with one embodiment of the invention. Upper annular sleeve 118a of the retaining ring has a top surface 119 with outer sidewall 120 extending from top surface 119. An inner sidewall 117 also extends from top surface 119. A plurality of holes 126 extend through top

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surface 119 of upper annular sleeve 118a. Holes 126 allow for lubrication of the interface between the retaining ring and polishing surface as will be explained in more detail in reference to FIGS. 6 and 7. One skilled in the art will appreciate that holes 126 can be configured in any pattern that allows for upper annular sleeve 118a to move in close proximity to the underside of the polishing surface.

FIG. 5 is a top view a lower annular sleeve of a retaining ring in accordance with one embodiment of the invention. Lower annular sleeve 118b includes base 122 that has inner sidewall 123 and outer sidewall 127 extending from base 122. Holes 136 extend through base 122 of lower annular sleeve 118b. As will be explained in more detail with respect to FIG. 10, holes 136 are configured to be connected to a fluid source. The fluid source provides a fluid flow to lower annular sleeve 118b which in turn causes the upper annular sleeve to move as will be described in more detail with reference to FIGS. 9 and 10. It should be appreciated that upper annular sleeve 118a of FIG. 4 nests with lower annular sleeve 118b to form the retaining ring.

FIG. 6 is a top view of an upper annular sleeve of a retaining ring in accordance with one embodiment of the invention. Upper annular sleeve 118a' the same as upper annular sleeve 118 of FIG. 4, however, upper annular sleeve 118a' is quartered as depicted by upper curved members 118a-1, 118a-2, 118a-3 and 118a-4. Of course, each of upper curved members 118a-1, 118a-2, 118a-3 and 118a-4 is moveably disposed over corresponding lower curved members. That is, lower annular sleeve 118b of FIG. 5 would be similarly quartered into lower curved members and nested with upper annular sleeve 118'. Gaps 128 between each of the upper curved members 118a-1, 118a-2, 118a-3 and 118a-4 provide controlled release points to avoid chattering of the polishing surface. Alternatively, upper annular sleeve 118a may include relief channels to systematically release the CDA from air-bearing platen 112 as shown in FIG. 7. The systematic release of the CDA avoids the build-up of pressure between platen 112 and the polishing surface when the upper annular sleeve is in close proximity to the underside of the polishing surface. It will be apparent to one skilled in the art that the configuration of annular ring 118a' allows for the individual control of each curved member. Thus, variations or localized deflections of the polishing surface are more easily accommodated. FIG. 6 illustrates retaining ring 118a' as four (4) curved members for exemplary purposes only and is not meant to be limiting, as retaining ring 118a' can be configured in any number of curved members.

FIG. 7 is a side view that shows channels formed in the top surface of the two curved members of an annular sleeve in accordance with one embodiment of the invention. Relief channels 129 allow for the controlled release of compressed dry air to preclude chattering of the polishing surface. One skilled in the art will appreciate that relief channels 129 can be implemented in numerous ways such as providing a v-shaped channel across the top surface of curved members 118a-1 and 118a-2 of the upper annular sleeve between holes 126. As shown in FIG. 7, relief notches 129 provide a mechanism for the systematic release of CDA in addition to gap 128. While relief channels 129 are depicted as a V-shaped channel across the top surface of the upper annular sleeve, it will be apparent to one skilled in the art that a number of other geometric configurations also can be used, e.g., rectangular-shaped channels or U-shaped channels.

FIG. 8 is a cross-sectional view of a retaining ring with an upper annular sleeve in a relaxed state in accordance with one embodiment of the invention. As shown here, it can be

### ***Double Patenting***

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 1-7, 11-18, 22, and 25-28 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-8 of U.S. Patent No. 6,656,024. Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter of the application claims is fully disclosed in the patent application and covered by the patented claim. The patented claims are inclusive for they are drafted using the "comprising-style" format and cover the subject matter of the applications claims. Since the application has obtained the right to exclude others from making or using the subject matter set forth in the claims of this application by virtue of the patented claims, the issuance of the application into a patent without a terminal disclaimer as provided for under 37 CFR section 1.321 (b) would amount to an extension of this right.



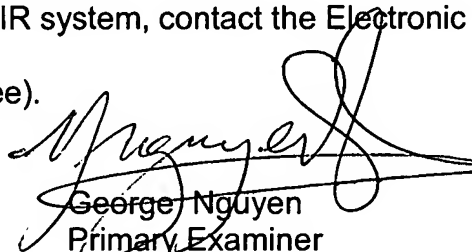
**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Nguyen whose telephone number is 571-272-4491. The examiner can normally be reached on Monday-Friday/630AM-300PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Hail can be reached on 571-272-4485. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*George Nguyen*  
Primary Examiner

  
George Nguyen  
Primary Examiner  
Art Unit 3723

GN – March 17, 2005